

MEMORANDUM (LABORATORY DATA REPORT)

Shaw Environmental and Infrastructure, Inc.
Contract No. EP-C-08-034

In reply refer to: 10-LH-67

To: Cindy Paul
Dennis Miller

From: Lisa Hudson

Lab: GC

Thru: Sujith Kumar
John Cox

Date: 10/27/10

Technical Directive No.: 7OA677DW
Task No.: 23993

Originator: Rick Wilkin
Copies: Rick Wilkin
Lisa Hudson
John Cox

Project/Sample Site: Pavillion Groundwater
Date Collected: 10/7/10
Date Received: 10/8, 13/2010
Date Analyzed: 10/20/10
No. Samples Analyzed: 4

Shaw Sample Set No.: 5763, 5768
Sample Matrix: Water
Analysis Type: Dissolved Gas
Sample Preparation: Not applicable

Method(s) Used : RSKSOP-194 rev4 Gas Analysis by Micro Gas Chromatograph
RSKSOP-175 rev5 Sample Preparation and Calculations for Dissolved Gas
Analysis in Water Samples Using a GC Headspace Equilibration Technique

Comments: All QC results met criteria established in RSKSOP-194, and RSKSOP-175.

Note: These samples were submitted in 150 mL stainless steel cylinders for headspace analysis by the method outlined in Technical Directive 7OA644DW.

Shaw Environmental and Infrastructure, Inc.
Analytical Service Results Report

Laboratory: **GC**

Report Date: **10/27/10**

Technical Directive: **70A677DW**

Analyst: **Lisa Hudson**

Lab Sample ID	5763-9	5763-10
Date Collected	10/7/2010	10/7/2010
Date Analyzed	10/20/2010	10/20/2010
Pressure, psig	28.3	45.8
Temperature °C	23.6	23.5
Sample Name	LD02	LD02 Dup

Analytes	CAS #	Unit	MDL	QL	Data	Data
Hydrogen	1333-74-0	ppm	0.668	20.0	43.9	ND
Oxygen	7782-44-7	ppm	5.00*	50.0*	143000	147000
Nitrogen	7727-37-9	ppm	5.00*	50.0*	593000	550000
Methane	74-82-8	ppm	0.569	10.0	709	56.9
Carbon Monoxide	630-08-0	ppm	10.0 *	10.0*	ND	ND
Carbon Dioxide	124-38-9	ppm	29.0	100	85.3	300
Ethane	74-84-0	ppm	0.698	10.0	ND	ND
Acetylene	74-86-2	ppm	1.16	10.0	ND	ND
Propane	74-98-6	ppm	0.603	10.0	ND	ND
i-Butane	7553-56-2	ppm	10.0 *	10.0*	ND	ND
n-Butane	106-97-8	ppm	0.444	10.0	ND	ND
i-Pentane	78-78-4	ppm	2.00*	10.0*	ND	ND
n-Pentane	109-66-0	ppm	2.00*	10.0*	ND	ND
Benzene	71-43-2	ppm	2.00*	10.0*	ND	ND
C6+	110-54-3	ppm	2.00*	10.0*	ND	ND
dilution factor	-	-	-	-	1	1

Comments:

The data quality objectives (DQO) of RSKSOP-194 have been met. The MDL's and QL's reported represent those completed on January 19 and April 19, 2010. *Estimated value. **>above linear range.

Notes:

1. If the parameter was detected above the quantitation limit (QL), the numeric result is reported; **BQL** denotes that the parameter was not detected at or above the quantitation limit; **BQL ()** denotes that the parameter was detected above the method detection limit (MDL) but below QL and the estimated numeric result is reported in parenthesis; **ND** denotes that the parameter was not detected at all. All the results are corrected with dilution factors (DF), if applicable.

2. " ." denotes that the information is not available or the analyte is not analyzed.

Shaw Environmental and Infrastructure, Inc.
Analytical Service Results Report

Laboratory: **GC**

Report Date: **10/27/10**

Technical Directive: **70A677DW**

Analyst: **Lisa Hudson**

Lab Sample ID	5768-1	5768-2
Date Collected	10/7/2010	10/7/2010
Date Analyzed	10/20/2010	10/20/2010
Pressure, psig	4.10	6.40
Temperature °C	23.6	23.5
Sample Name	LD02-2	LD02-2 (dup)

Analytes	CAS #	Unit	MDL	QL	Data	Data
Hydrogen	1333-74-0	ppm	0.668	20.0	52.0	52.5
Oxygen	7782-44-7	ppm	5.00*	50.0*	65200	86000
Nitrogen	7727-37-9	ppm	5.00*	50.0*	190000	230000
Methane	74-82-8	ppm	0.569	10.0	509	558
Carbon Monoxide	630-08-0	ppm	10.0 *	10.0*	ND	ND
Carbon Dioxide	124-38-9	ppm	29.0	100	56.3	73.7
Ethane	74-84-0	ppm	0.698	10.0	ND	ND
Acetylene	74-86-2	ppm	1.16	10.0	ND	ND
Propane	74-98-6	ppm	0.603	10.0	ND	ND
i-Butane	7553-56-2	ppm	10.0 *	10.0*	ND	ND
n-Butane	106-97-8	ppm	0.444	10.0	ND	ND
i-Pentane	78-78-4	ppm	2.00*	10.0*	ND	ND
n-Pentane	109-66-0	ppm	2.00*	10.0*	ND	ND
Benzene	71-43-2	ppm	2.00*	10.0*	ND	ND
C6+	110-54-3	ppm	2.00*	10.0*	ND	ND
dilution factor	-	-	-	-	1	1

Comments:

The data quality objectives (DQO) of RSKSOP-194 have been met. The MDL's and QL's reported represent those completed on January 19 and April 19, 2010. *Estimated value. **>above linear range.

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Shaw Environmental and Infrastructure, Inc.

Analytical Service Results Report

Laboratory:

GC

Report Date:

10/27/10

Technical Directive:

70A677DW

Analyst:

Lisa Hudson

Method:

RSKSOP-175 & RSKSOP-194

Analytes

Codes

Unit

Methane

74-82-8

µg/L, in water

Carbon Dioxide

124-38-9

µg/L, in water

Lab Sample ID	Date Collected	Date Analyzed	Field Sample ID	MDL	QL	Data	DF	MDL	QL	Data	DF
5763-9	10/7/10	10/20/10	LD02	0.0352	0.646	45.9	1	34.7	433	BQL(369)	1
5763-10	10/7/10	10/20/10	LD02 dup	0.0496	0.914	5.20	1	49.3	612	1,840	1
5768-1	10/7/10	10/20/10	LD02-2	0.0160	0.285	14.5	1	15.3	191	BQL(107)	1
5768-2	10/7/10	10/20/10	LD02-2 (dup)	0.0176	0.317	17.7	1	17.0	212	BQL(156)	1

Comments:

The data quality objectives (DQO) of RSKSOP-194/4 have been met. The MDL's and QL's reported represent those completed January 19 and April 19, 2010.

Notes:

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Shaw Environmental and Infrastructure, Inc.

Analytical Service Results Report

Laboratory:

GC

Report Date:

10/27/10

Technical Directive:

70A677DW

Analyst:

Lisa Hudson

Method:

RSKSOP-175 & RSKSOP-194

Analytes

Codes

Unit

Ethane

74-84-0

µg/L, in water

Acetylene

74-86-2

µg/L, in water

Lab Sample ID	Date Collected	Date Analyzed	Field Sample ID	MDL	QL	Data	DF	MDL	QL	Data	DF
5763-9	10/7/10	10/20/10	LD02	0.114	1.61	ND	1	3.64	31.2	ND	1
5763-10	10/7/10	10/20/10	LD02 dup	0.159	2.28	ND	1	5.12	44.2	ND	1
5768-1	10/7/10	10/20/10	LD02-2	0.0510	0.711	ND	1	1.60	13.8	ND	1
5768-2	10/7/10	10/20/10	LD02-2 (dup)	0.0540	0.792	ND	1	1.78	15.4	ND	1

Comments:

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Shaw Environmental and Infrastructure, Inc.

Analytical Service Results Report

Laboratory:

GC

Report Date:

10/27/10

Technical Directive:

70A677DW

Analyst:

Lisa Hudson

Method:

RSKSOP-175 & RSKSOP-194

Analytes

Codes

Unit

Propane

74-98-6

µg/L, in water

Butane

106-97-8

µg/L, in water

Lab Sample ID	Date Collected	Date Analyzed	Field Sample ID	MDL	QL	Data	DF	MDL	QL	Data	DF
5763-9	10/7/10	10/20/10	LD02	0.114	1.91	ND	1	0.0928	2.05	ND	1
5763-10	10/7/10	10/20/10	LD02 dup	0.163	2.71	ND	1	0.128	2.90	ND	1
5768-1	10/7/10	10/20/10	LD02-2	0.0528	0.845	ND	1	0.0406	0.905	ND	1
5768-2	10/7/10	10/20/10	LD02-2 (dup)	0.0572	0.937	ND	1	0.0464	1.00	ND	1

Comments:

The data quality objectives (DQO) of RSKSOP-194/4 have been met. The MDL's and QL's reported represent those completed January 19 and April 19, 2010.

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Shaw Environmental and Infrastructure, Inc.

Analytical Service Results Report

Laboratory:

GC

Report Date:

10/27/10

Technical Directive:

70A677DW

Analyst:

Lisa Hudson

Method:

RSKSOP-175 & RSKSOP-194

Analytes

Codes

Unit

Hydrogen

1333-74-0

µg/L, in water

Lab Sample ID	Date Collected	Date Analyzed	Field Sample ID	MDL	QL	Data	DF
5763-9	10/7/10	10/20/10	LD02	0.0030	0.0456	0.201	1
5763-10	10/7/10	10/20/10	LD02 dup	0.0042	0.0644	ND	1
5768-1	10/7/10	10/20/10	LD02-2	0.0014	0.0200	0.104	1
5768-2	10/7/10	10/20/10	LD02-2 (dup)	0.0014	0.0224	0.118	1

Comments:

The data quality objectives (DQO) of RSKSOP-194/4 have been met. The MDL's and QL's reported represent those completed January 19 and April 19, 2010.

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Analytical Service Results Report

Laboratory:

GC

Report Date:

10/27/10

Technical Directive:

70A677DW

Analyst:

Lisa Hudson

Analytes		Unit	QC Sample ID		Argon Blank			Refinery Gas		
			Additional ID		MB			CCC		
			Date Prepared		10/20/10			5/13/10		
			Date Analyzed		10/20/10			10/20/10		
Names	CAS #		MDL	QL	Data	True Values	% Rec.	Data	True Values	% Rec.
Hydrogen	1333-74-0	ppm	0.668	20.0	ND	-	-	144000	125030	115
Oxygen/Ambient Air	7782-44-7	ppm	5.00*	50.0*	-	-	-	-	-	-
Nitrogen	7727-37-9	ppm	5.00*	50.0*	-	-	-	356000	370900	96.0
Methane	74-82-8	ppm	0.569	10.0	ND	-	-	54000	50080	108
Carbon Monoxide	630-08-0	ppm	10.0 *	10.0*	ND	-	-	9880	10010	98.7
Carbon Dioxide	124-38-9	ppm	29.0	100	ND	-	-	31400	30030	105
Ethane	74-84-0	ppm	0.698	10.0	ND	-	-	41000	40120	102
Acetylene	74-86-2	ppm	1.16	10.0	ND	-	-	11000	10000	110
Propane	74-98-6	ppm	0.603	10.0	ND	-	-	60900	60150	101
i-Butane	7553-56-2	ppm	10.0 *	10.0*	ND	-	-	49400	50180	98.4
n-Butane	106-97-8	ppm	0.444	10.0	ND	-	-	45100	40220	112
i-Pentane	78-78-4	ppm	2.00*	10.0*	ND	-	-	11200	10020	112
n-Pentane	109-66-0	ppm	2.00*	10.0*	ND	-	-	9550	10040	95.1
Benzene	71-43-2	ppm	2.00*	10.0*	-	-	-	1010	1000	101
C6+	110-54-3	ppm	2.00*	10.0*	-	-	-	975	1000	97.5
dilution factor	-	-	-	-	-	1	-	-	1	

Comments:

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Notes:

1. **MB** - Method Blank. **CCC** - Continuing Calibration Check. A calibration standard analyzed within the batch of samples. **LCS** - Laboratory Control Spike. A laboratory blank spiked with analytes at known concentrations. **MS** - Matrix Spike. A field sample spiked with known concentrations of analytes. The field sample id is identified. **SS** - Samples obtained from a second source. **DUP** - Field sample duplicate analysis. A sample selected by the lab analyst to analyze as a duplicate. It is reported in the sample result section. **% REC** - Percent Recovery. Calculated as the percentage of the results to the true values. It equals to % accuracy for CCC.

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Shaw Environmental and Infrastructure, Inc.
Analytical Service Results Report

Laboratory: **GC**

Report Date: **10/27/10**

Technical Directive: **70A677DW**

Analyst: **Lisa Hudson**

Analyst:	Lisa Hudson	QC Sample ID			Refinery Gas			Argon Blank		
		Additional ID			SS			MB		
		Date Prepared			7/8/10			10/20/10		
		Date Analyzed			10/20/10			10/20/10		
Analytes		Unit	MDL	QL	Data	True Values	% Rec.	Data	True Values	% Rec.
Names	CAS #									
Hydrogen	1333-74-0	ppm	0.668	20.0	134000	125030	107	ND	-	-
Oxygen/Ambient Air	7782-44-7	ppm	5.00*	50.0*	-	-	-	-	-	-
Nitrogen	7727-37-9	ppm	5.00*	50.0*	339000	370900	91.4	-	-	-
Methane	74-82-8	ppm	0.569	10.0	51000	50080	102	ND	-	-
Carbon Monoxide	630-08-0	ppm	10.0 *	10.0*	9600	10010	95.9	ND	-	-
Carbon Dioxide	124-38-9	ppm	29.0	100	29800	30030	99.2	ND	-	-
Ethane	74-84-0	ppm	0.698	10.0	39100	40120	97.5	ND	-	-
Acetylene	74-86-2	ppm	1.16	10.0	10500	10000	105	ND	-	-
Propane	74-98-6	ppm	0.603	10.0	58600	60150	97.4	ND	-	-
i-Butane	7553-56-2	ppm	10.0 *	10.0*	47200	50180	94.1	ND	-	-
n-Butane	106-97-8	ppm	0.444	10.0	43400	40220	108	ND	-	-
i-Pentane	78-78-4	ppm	2.00*	10.0*	10600	10020	106	ND	-	-
n-Pentane	109-66-0	ppm	2.00*	10.0*	9130	10040	90.9	ND	-	-
Benzene	71-43-2	ppm	2.00*	10.0*	1010	1000	101	-	-	-
C6+	110-54-3	ppm	2.00*	10.0*	971	1000	97.1	-	-	-
dilution factor	-	-	-	-	-	1	-	-	1	-

Comments:

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Notes:

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Analytical Service Results Report

Laboratory: **GC**

Report Date: **10/27/10**

Technical Directive: **70A677DW**

Analyst: **Lisa Hudson**

Analyst: <div>Lisa Hudson</div>			QC Sample ID		Refinery Gas			Argon Blank		
			Additional ID		CCC			MB		
			Date Prepared		5/13/10			10/20/10		
			Date Analyzed		10/20/10			10/20/10		
Analytes		Unit	MDL	QL	Data	True Values	% Rec.	Data	True Values	% Rec.
Names	CAS #									
Hydrogen	1333-74-0	ppm	0.668	20.0	139000	125030	111	ND	-	-
Oxygen/Ambient Air	7782-44-7	ppm	5.00*	50.0*	-	-	-	-	-	-
Nitrogen	7727-37-9	ppm	5.00*	50.0*	356000	370900	96.0	-	-	-
Methane	74-82-8	ppm	0.569	10.0	52400	50080	105	ND	-	-
Carbon Monoxide	630-08-0	ppm	10.0 *	10.0*	10500	10010	105	ND	-	-
Carbon Dioxide	124-38-9	ppm	29.0	100	30700	30030	102	ND	-	-
Ethane	74-84-0	ppm	0.698	10.0	40200	40120	100	ND	-	-
Acetylene	74-86-2	ppm	1.16	10.0	10800	10000	108	ND	-	-
Propane	74-98-6	ppm	0.603	10.0	61000	60150	101	ND	-	-
i-Butane	7553-56-2	ppm	10.0 *	10.0*	49300	50180	98.2	ND	-	-
n-Butane	106-97-8	ppm	0.444	10.0	45900	40220	114	ND	-	-
i-Pentane	78-78-4	ppm	2.00*	10.0*	11500	10020	115	ND	-	-
n-Pentane	109-66-0	ppm	2.00*	10.0*	9660	10040	96.2	ND	-	-
Benzene	71-43-2	ppm	2.00*	10.0*	1040	1000	104	-	-	-
C6+	110-54-3	ppm	2.00*	10.0*	1010	1000	101	-	-	-
dilution factor	-	-	-	-	-	1	-	-	1	-

Comments:

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